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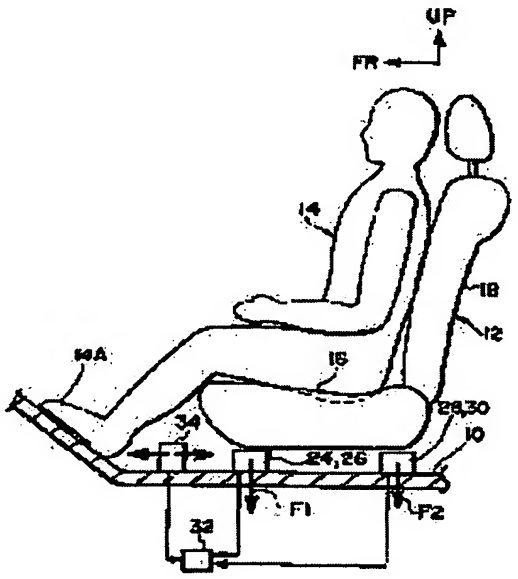
(54) OCCUPANT'S BODY WEIGHT DETECTING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To reduce the cost of parts, and to estimate the weight of an occupant's body with high accuracy.

SOLUTION: Between the position near the front end of a seat cushion frame and a floor 10, front side load sensors 24 and 26 to detect the seat load from a load applied to the front part of a seat 12 are provided. Between the position near the rear end of the seat cushion frame and the floor 10, rear side load sensors 28 and 30 to detect the seat load from a load applied to the rear part of the seat 12 are provided. The load sensors 24, 26, 28, and 30 are connected to a load estimating circuit 32, the load estimating circuit 32 calculates the gravity center of the load of the seat 12, depending on the loads F1 and F2 at the front side and the rear side detected by the load sensors 24, 26, 28, and 30, and the seat load is corrected depending on the calculated value, and at the same time, the weight of the occupant's body is estimated depending on the corrected load.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the crew weight detection equipment which relates to crew weight detection equipment, especially is arranged by the sheet of an automobile.
[0002]
[Description of the Prior Art] Conventionally, the structure shown in JP,7-186880,A is known as an example of the crew weight detection equipment arranged by the sheet of an automobile.
[0003] As shown in drawing 10 , with this equipment, the weight sensor 102 is arranged in seat cushion 100A of a sheet 100, and the inclination sensor 104 which detects the tilt angle of seat-back 100B is arranged in the link section of seat cushion 100A and seat-back 100B. Although the detection value by the weight sensor 102 differs from the actual weight of the crew who sat down on the sheet 100, a control unit 106 detects the characteristic feature which affects the difference of the detection value by the weight sensor 102, and actual crew's weight from the detecting signal from the inclination sensor 104, and it asks for crew's actual weight from the function based on this detected characteristic feature, and the function of detection weight.
[0004]
[Problem(s) to be Solved by the Invention] However, with this equipment, since the inclination sensor 104 other than the weight sensor 102 was needed in order to detect crew's actual weight, there was fault that a parts cost increased. By some taking-a-seat posture of crew, although it is the whole sheet, i.e., the both sides of a seat cushion and a seat back, and it can consider performing a weight detection in order to improve this, since the recess loads to a floor differ greatly from crew's pin, even if the whole sheet performs a weight detection, the precision of a detection load gets worse and the fault that dispersion in presumed weight becomes large as the result cannot be solved.
[0005] It is the purpose to obtain the crew weight detection equipment which this invention can reduce a parts cost in consideration of the above-mentioned fact, and can presume crew's weight with a sufficient precision.
[0006]
[Means for Solving the Problem] A load detection means to detect each load applied before and after a sheet including the load which this invention according to claim 1 requires for a seat back, A correction means to rectify each load before and after computing the load center of gravity of a sheet based on each load before and after detecting with this load detection means and detecting with the aforementioned load detection means based on the calculation value, It is characterized by having a crew weight estimation means to presume crew weight based on the correction load rectified with this correction means.
[0007] Therefore, when crew sits down on a sheet, each load applied before and after a sheet including the load concerning a seat back is detected by the load detection means. Based on each load before and behind this, crew weight is presumed by the crew weight estimation means based on the correction load which computes the load center of gravity of a sheet, rectifies each load of order by the correction means based on the calculation value, and was rectified with the correction means. For this reason, the error of the presumed weight by change of a taking-a-seat posture can be made small, and crew's weight can be presumed with a sufficient precision.

[0008] The front lever rocked according to the load applied to the pars anterior of a sheet including the load which this invention according to claim 2 requires for a seat back, The back lever rocked according to the load applied to the posterior part of a sheet including the load concerning a seat back, A load detection means to detect the sum of the load doubled by the lever before the above by the predetermined rate of redoubling, and the load doubled by the lever after the above by the predetermined rate of redoubling, the rate of load redoubling according the rate of load redoubling by ****** and the lever before the above to the lever after the above -- comparing -- the rate of predetermined -- it is characterized by setting up greatly

[0009] Therefore, although a large load escapes from crew's pin on a floor when the crew who sat down on the sheet does an anteversion posture, at this time, the augend of the load concerning the pars anterior of a sheet becomes large compared with the decrement of the load concerning the posterior part of a sheet. For this reason, the rate of load redoubling of the front lever greatly set up compared with the rate of load redoubling by the back lever doubles at the big rate of redoubling, and the load concerning the pars anterior of a sheet is transmitted to a load detection means with it. Consequently, the large load which escaped from crew's pin on the floor can be rectified. When the crew who sat down on the sheet does a backward-tilting posture, while the load which escapes from crew's pin on a floor becomes small on the other hand, the decrement of the load concerning the pars anterior of a sheet becomes small compared with the augend of the load concerning the posterior part of a sheet. For this reason, the load doubled by the front lever also becomes small and the small load which escaped from crew's pin on the floor can be rectified.

[0010]

[Embodiments of the Invention] The 1st operation gestalt of the crew weight detection equipment of this invention is explained according to drawing 1 - view 3 .

[0011] In addition, the arrow head in drawing FR shows the orientation of the vehicle front, and the arrow head UP shows the orientation of the vehicle upper part. As shown in drawing 1 , the sheet 12 is attached in the floor 10 of a vehicle, and the sheet 12 equips it with the seat cushion 16 to which crew 14 sits down, and the seat back 18 supporting crew's 14 regions of back.

[0012] As shown in drawing 2 , between the floors 10 of a vehicle near the front end section of the seat cushion frames 20 and 22 of right and left of a sheet 12, the front side load sensors 24 and 26 as a load detection means to detect a sheet load from the load (arrow head F1 of drawing 1) applied to the pars anterior of a sheet 12 including the load applied to a seat back 18, respectively are arranged. Moreover, between the floors 10 of a vehicle near the back end section of the seat cushion frames 20 and 22 of right and left of a sheet 12, the back side load sensors 28 and 30 as a load detection means to detect a sheet load from the load (arrow head F2 of drawing 1) applied to the posterior part of a sheet 12 including the load applied to a seat back 18, respectively are arranged.

[0013] As shown in drawing 1 , these front side load sensors 24 and 26 and the back side load sensors 28 and 30 It connects with the load estimation circuit 32 as the correction means constituted including the microcomputer, and a crew weight estimation means. While this load estimation circuit 32 computes the load center of gravity of a sheet 12 based on each loads F1 and F2 before and after detecting by the load sensors 24, 26, 28, and 30 and each loads F1 and F2 are rectified based on the calculation value Crew weight is presumed based on the rectified correction load. Moreover, the acceleration sensor 34 which detects the acceleration which acts on the cross direction of a vehicle is connected to the load estimation circuit 32, and even if it is based on acceleration G detected by the acceleration sensor 34, it rectifies.

[0014] Next, an operation of the **** 1 operation gestalt is explained. With the crew weight detection equipment of the **** 1 operation gestalt, in case crew's 14 weight is presumed, acceleration G is read into the load estimation circuit 32 from an acceleration sensor 34. Moreover, while each load is read into the load estimation circuit 32 from the front side load sensors 24 and 26 and the front side load F1 is computed as these averages, each load is read into the load estimation circuit 32 from the back side load sensors 28 and 30, and the after side load F2 is computed as these averages.

[0015] Next, before computing, while the load estimation circuit 32 computes load center-of-gravity position GX=F1/(F1+F2) of a cross direction from the side load F1 and the after side load F2 By this load center-of-gravity position GX and change of acceleration G, the front side load F1 and the after

side load F2 are rectified, sheet load F=A(F1+F2)+BGX+CG is computed, and crew's presumed weight W1=f (F) is computed from this sheet load F.
[0016] In addition, A, B, and C are constants, respectively and are memorized by the map of the load estimation circuit 32.
[0017] That is, when the front side load F1 and the after side load F2 are equal, it is set to load center-of-gravity position GX=1/2, and the center between the front side load sensors 24 and 26 and the back side load sensors 28 and 30 serves as a load center-of-gravity position. On the other hand, by crew's 14 anteversion posture etc., in being large, in order that a load center-of-gravity position may move [the front side load F1] to front side load sensor 24 and 26 side compared with the after side load F2, the load center-of-gravity position GX is set to GX>1/2. Consequently, in sheet load F=A(F1+F2)+BGX+CG, the large load which escapes from crew's 14 pin 14A to a floor 10 can be rectified, and crew's presumed weight W1=f (F) can be computed with a sufficient precision.
[0018] Moreover, by the reliance posture (backward-tilting posture) to crew's 14 seat back 18 etc., in order that a load center-of-gravity position may move [the front side load F1] to a parvus case to back side load sensor 28 and 30 side compared with the after side load F2, the load center-of-gravity position GX is set to GX<1/2. Consequently, in sheet load F=A(F1+F2)+BGX+CG, the small load which escapes from crew's 14 pin 14A to a floor 10 can be rectified, and crew's presumed weight W1=f (F) can be computed with a sufficient precision.
[0019] Moreover, when acceleration G has occurred to the front, the recess load from crew's 14 pin 14A to a floor 10 becomes small, and when decelerating G has occurred to the front, the recess load from crew's 14 pin 14A to a floor 10 becomes large.
[0020] Therefore, as shown in drawing 3 , with the **** 1 operation gestalt, the correction alpha 1 of the load center-of-gravity position accompanied by posture change of crew 14 and the correction alpha 2 by change of acceleration G are carried out to the measured sheet loads F1 and F2. For this reason, error N of crew's actual weight W and the presumed weight W1 can be made small, and crew's weight can be presumed with a sufficient precision. Moreover, a parts cost can be reduced because of the configuration which does not need an inclination sensor like the conventional technique.
[0021] Next, the 2nd operation gestalt of the crew weight detection equipment of this invention is explained according to drawing 4 - view 6 .
[0022] As shown in drawing 4 , the sheet 12 is attached in the floor 10 of a vehicle, and the sheet 12 equips it with the seat cushion 16 to which crew sits down, and the seat back 18 supporting crew's regions of back.
[0023] The sheet slide rail 40 of a right-and-left couple is arranged along with the vehicle cross direction at the sheet 12, and the sheet slide lower rail 42 order ends of each sheet slide rail 40 are being fixed to the floor 10 by holddown members, such as a bolt, respectively. The sheet slide upper rail 44 is set to these sheet slide lower rails 42 possible [a slide] to the vehicle cross direction, respectively, and the seat cushion frames 20 and 22 of a sheet 12 are connected with the sheet slide upper rail 44. Therefore, the move to a vehicle cross direction of a sheet 18 is attained in one with the sheet slide upper rail 44 to the sheet slide lower rail 42.
[0024] The shaft 46 is constructed by vertical wall 44A set up near the front end section of the sheet slide upper rail 44 on either side. Bearing 47A formed in the front lever 47 front side right-and-left both ends is supported to revolve respectively possible [rotation] by this shaft 46, and the front lever 47 can rotate a shaft 46 to a center of rotation to the clock hand of cut (the orientation of arrow head A of drawing 5) of drawing 5 , and the anti-clock hand of cut (the orientation of arrow head B of drawing 5) of drawing 5 . Moreover, the front end section of bearing 47A of the front lever 47 is supported to revolve possible [rotation] with the shaft 48 by the vertical walls 20A and 22A formed in the front end lower part of the seat cushion frames 20 and 22. Therefore, from the regio femoralis of the crew who sat down to the seat cushion 16, if the pars anterior of the seat cushion frames 20 and 22 is pressed below by the load which acts on the pars anterior of a seat cushion 16, the front lever 47 will rotate according to it, to the anti-clock hand of cut (the orientation of arrow head B of drawing 5) of drawing 5 .
[0025] The front lever 47 is made into the shape of Y character which the front side opened by plane view, and back end section 47B has reached the abbreviation central lower part of a seat cushion 16.

The load sensor 52 as a load detection means is arranged in the upper part of back end section 47B of the front lever 47. This load sensor 52 is being fixed to the center-section inferior surface of tongue of a bracket 53, and right-and-left both-ends 53A of a bracket 53 is being fixed to the sheet slide upper rail 44 on either side, respectively.

[0026] On the other hand, the shaft 54 is constructed by vertical wall 44B set up near the back end section of the sheet slide upper rail 44. Bearing 55A formed in after [the back lever 55] side right-and-left both ends is supported to revolve respectively possible [rotation] by this shaft 54, and the back lever 55 can rotate a shaft 54 to a center of rotation to the clock hand of cut (the orientation of arrow head C of drawing 5) of drawing 5 , and the anti-clock hand of cut (the orientation of arrow head D of drawing 5) of drawing 5 . Moreover, the back end section of bearing 55A of the back lever 55 is supported to revolve possible [rotation] with the shaft 56 by the vertical walls 20B and 22B formed in the back end lower part of the seat cushion frames 20 and 22. Therefore, from the hip of the crew who sat down to the seat cushion 16, if the posterior part of the seat cushion frames 20 and 22 is pressed below by the load which acts on the posterior part of a seat cushion 16, the back lever 55 will rotate according to it, to the clock hand of cut (the orientation of arrow head C of drawing 5) of drawing 5 .

[0027] The back lever 55 is made into the shape of Y character which the back side opened by plane view, and front end section 55B has reached underneath the back end section 47B of the front lever 47. Therefore, the load sensor 52 can detect now the sum of the load of the both sides which act on back end section 47B of the front lever 47, and front end section 55B of the back lever 55.

[0028] As shown in drawing 6 (A) The distance L1 between the end points P2 of the center of rotation P1 of the front lever 47, and the seat cushion frames 20 and 22, the distance L2 between the contacting points P3 of the center of rotation P1 of the front lever 47, and the load sensor 52, the center of rotation P4 and the seat cushion frame 20 of the back lever 55, Between the distance L3 between end-point P5 of 22, and the distance L4 between the contacting points P6 of the center of rotation P4 of the back lever 55, and the front lever 47 L1>L3 or L2< -- the rate of load redoubling according the rate of load redoubling according [there is a relation of L4 and] to the highly sensitive setup 47, i.e., a front lever, to the load by the side of the seat cushion frames 20 and 22 front to the back lever 55 -- comparing -- the rate of predetermined -- it has set up greatly

[0029] Moreover, as shown in drawing 5 , the stopper 58 for a movable domain limit of the back lever 55 and the front lever 47 and the stopper 59 prepare in the lower part of the seat cushion 16 which counters the lower part of front end section 55B of the back lever 55, and near the back end section 47B of the front lever 47, and the titubation domain of a **** cage, the back lever 55, and the front lever 47 is restricted to it, respectively. In addition, right-and-left both-ends 58A of a stopper 58 is being fixed the sheet slide upper rail 44 on either side or near the right-and-left both-ends 53A of a bracket 53, respectively.

[0030] Next, an operation of the **** 2 operation gestalt is explained. With the crew weight detection equipment of the **** 2 operation gestalt, if crew sits down on a sheet 12, the load which acts on the pars anterior of a seat cushion 16 will act on the front lever 47 from the regio femoralis of the crew who sat down to the seat cushion 16. Moreover, the load which acts on the posterior part of a seat cushion 16 acts on the back lever 55 from the hip of the crew who sat down to the seat cushion 16. Consequently, the load of the both sides of back end section 47B of the front lever 47 and front end section 55A of the back lever 55 can act, and crew's weight can be presumed by measuring this load by the load sensor 52.

[0031] For this reason, when the crew 14 who sat down on the sheet 12 is in a slouchy posture (anteversion posture), while the load which escapes from crew's 14 pin 14C on a floor 10 becomes large, the augend of the load concerning the pars anterior of a seat cushion 16 becomes large compared with the decrement of the load concerning the posterior part of a seat cushion 16. For this reason, the load doubled by the front lever 47 becomes large, and the load which escaped from crew's pin on the floor can be rectified.

[0032] Moreover, it becomes large to the load F5 which acts on the posterior part of the hip of the crew to whom the load F4 which acts on the pars anterior of the regio femoralis of the crew who sat down to the seat cushion 16 through the front lever 47 when the force F3 to the front was applied to crew in the time of braking, as shown in drawing 6 (B) to the seat cushion 16 sat down to the seat

cushion 16 through the back lever 55 to the seat cushion 16. Consequently, since the rate of redoubling of the load which acts on the front lever 47 is set up more highly than the rate of redoubling of the load which acts on the back lever 55, a lost part of the detection weight by the load which escapes to a floor through crew's pin can be rectified by the increment of a load which acts on the front lever 47.

[0033] Moreover, although the load F6 which escapes to a floor 10 through crew's pin becomes large when a vehicle goes down a slope In this case, while the force to the front by the inclination of a slope acts on the load which acts on the pars anterior of a seat cushion 16 from the regio femoralis of the crew who sat down to the seat cushion 16 through the front lever 47 In order that the force to the front by the inclination of a slope may act also on the load which acts on the posterior part of a seat cushion 16 from the hip of the crew who sat down to the seat cushion 16 through the back lever 55, Also in this case, a lost part of the detection weight by the load which escapes to a floor through crew's pin can be rectified like the time of braking by the force to the front which acts on the front lever 47 and the back lever 55.

[0034] When the crew who sat down on the sheet 12 does a backward-tilting posture, while the load which escapes from crew's pin on a floor becomes small on the other hand, the augend of the load concerning the posterior part of a seat cushion 16 becomes large compared with the decrement of the load concerning the pars anterior of a seat cushion 16. For this reason, the load doubled by the front lever 47 also becomes small, and the small load which escaped from crew's pin on the floor can be rectified. In addition, when a vehicle accelerates and a vehicle goes up a slope, a lost part of the detection weight by the small load which escapes to a floor through a pin with acceleration by the force to the back which acts on the front lever 47 and the back lever 55 can be rectified similarly.

[0035] Therefore, with the crew weight detection equipment of the **** 2 operation gestalt, the error with crew's presumed weight measured by crew's actual weight and load sensor 52 can be made small, and crew's weight can be presumed with a sufficient precision. Moreover, a parts cost can be reduced because of the easy configuration which detects a load by one load sensor 52 using the front lever 47 and the back lever 55. Moreover, the load sensor 52 can be protected from a large load with the stopper 58 for a movable domain limit, and the stopper 59.

[0036] In addition, with the **** 2 operation gestalt, a stopper 58 is arranged underneath the front end section 55B of the back lever 55, and although the stopper 59 has been arranged in the lower part of the seat cushion 16 which counters near the back end section 47B of the front lever 47, the position of a stopper 58 and the stopper 59 is not limited to these positions.

[0037] Next, the 3rd operation gestalt of the crew weight detection equipment of this invention is explained according to drawing 7 - view 9 .

[0038] the [in addition,] -- the [1 operation gestalt and] -- if attached to the same member as 2 operation gestalt, the same sign is attached and the explanation is omitted

[0039] As shown in drawing 8 , near the front end section of the sheet slide upper rail 44 on either side, the shaft 64 is supported to revolve possible [rotation] through the front bracket 62. Soffit section 66A of the front lever 66 is being fixed to the both ends of this shaft 64, respectively, and rotation of the front lever 66 and the shaft 64 to the anti-clock hand of cut (the orientation of arrow head A of drawing 7) of drawing 7 and the clock hand of cut (the orientation of arrow head B of drawing 7) of drawing 7 is enabled.

[0040] It is supported to revolve near the front end section of the seat cushion frames 20 and 22 of right and left of a sheet 12 with the shaft 68 by upper-limit section 66B of the front lever 66 possible [the rotation to the anti-clock hand of cut (the orientation of arrow head C of drawing 7) of drawing 7 , and the clock hand of cut (the orientation of arrow head D of drawing 7) of drawing 7].

[0041] Moreover, near the back end section of the sheet slide upper rail 44 on either side, the shaft 72 is supported to revolve possible [rotation] through the back bracket 70. Soffit section 74A of the back lever 74 is being fixed to the both ends of this shaft 72, respectively, and rotation of the back lever 74 and the shaft 72 to the anti-clock hand of cut (the orientation of arrow head E of drawing 7) of drawing 7 and the clock hand of cut (the orientation of arrow head F of drawing 7) of drawing 7 is enabled.

[0042] It is supported to revolve near the back end section of the seat cushion frames 20 and 22 of right and left of a sheet 12 with the shaft 76 by upper-limit section 74B of the back lever 74 possible

[the rotation to the anti-clock hand of cut (the orientation of arrow head G of drawing 7) of drawing 7 , and the clock hand of cut (the orientation of arrow head H of drawing 7) of drawing 7].
[0043] As shown in drawing 9 , to soffit section 74A of the left-hand side back lever 74 If heights 74C is formed below and the load F9 to a lower part acts on the upper-limit section 74 of the back lever 74 from the seat cushion frame 20 The back lever 74 rotates a shaft 72 to a center of rotation to the anti-clock hand of cut (the orientation of arrow head E of drawing 9) of drawing 9 , and presses the load sensor 78 as a load detection means by which heights 74C was attached in the back bracket 70, back (the orientation of arrow head K of drawing 9). In addition, the load receptacle spring 80 is arranged in the periphery section of the load sensor 78, and the back lever 74 is energized to the clock hand of cut (the orientation of arrow head F of drawing 9) of drawing 9 .
[0044] As shown in drawing 8 , the shaft 64 and the shaft 72 are connected through the connecting rod 82. These connecting-rod 82 order both ends 82A and 82B are supported to revolve possible [rotation] by heights 64A and heights 72A which were formed in the shaft 64 and the shaft 72, respectively, on the turning effort which acts on a shaft 64, a connecting rod 82 moves back (the orientation of arrow head J of drawing 7), and the turning effort which acts on a shaft 64 is applied to the turning effort of a shaft 72.
[0045] moreover, the length of the back lever 74 -- comparing -- the length of the front lever 66 -- a predetermined length -- the rate of redoubling of the load to which the rate of redoubling of the load which is set up for a long time and acts on the front lever 66 acts on the back lever 74 -- the rate of predetermined -- it is set up highly Consequently, the load which acts on the front lever 66, and the load which acts on the back lever 74 are doubled from the predetermined rate of redoubling, respectively, and it acts on the load sensor 78.
[0046] In addition, as shown in drawing 9 , the stoppers 84 and 86 for a movable domain limit are arranged in the position before and after heights 74C by the back bracket 70, and the load sensor 78 is protected with the load receptacle spring 80 to it.
[0047] Next, an operation of the **** 3 operation gestalt is explained. With the crew weight detection equipment of the **** 3 operation gestalt, if crew 14 sits down to a seat cushion 16 as shown in drawing 7 , the load which acts on the pars anterior of a seat cushion 16 will act on the front lever 66 from regio-femoralis 14A of the crew 14 who sat down to the seat cushion 16 [near the front end section of the seat cushion frames 20 and 22 on either side]. Moreover, the load which acts on the posterior part of a seat cushion 16 acts on the back lever 74 from hip 14B of the crew 14 who sat down to the seat cushion 16 [near the back end section of the seat cushion frames 20 and 22 on either side]. Consequently, while a load acts on soffit section 66A of the front lever 66, and soffit section 74A of the back lever 74, crew's 14 weight can be presumed by the load which acts on soffit section 66A of the front lever 66 through a connecting rod 82 being transmitted to the back lever 74, and measuring these loads by the load sensor 78.
[0048] Moreover, although the load which escapes to a floor through crew's 14 pin becomes large for example, when crew 14 is in an anteversion posture in this case, from regio-femoralis 14A of the crew 14 who sat down to the seat cushion 16 [near the front end section of the seat cushion frames 20 and 22 on either side] The augend of a load F10 which acts on the pars anterior of a seat cushion 16 from hip 14B of the crew 14 who sat down to the seat cushion 16 [near the back end section of the seat cushion frames 20 and 22 on either side] It becomes large to the decrement of a load F11 which acts on the posterior part of a seat cushion 16. Consequently, since the rate of redoubling of the load which acts on the front lever 66 is set up more highly than the rate of redoubling of the load which acts on the back lever 74, a lost part of the detection weight by the large load which escapes to a floor 10 through pin 14C can be rectified by the increment of a load which acts on the front lever 66.
[0049] Moreover, as well as the 2nd operation gestalt when a vehicle goes down a slope, although the load which escapes to a **** floor becomes large, crew's 14 pin in this case, from regio-femoralis 14A of the crew 14 who sat down to the seat cushion 16 [near the front end section of the seat cushion frames 20 and 22 on either side] While the force to the front by the inclination of a slope acts on the load which acts on the pars anterior of a seat cushion 16 The force to the front by the inclination of a slope acts on the load which acts on the posterior part of a seat cushion 16 from hip 14B of the crew 14 who sat down to the seat cushion 16 [near the back end section of the seat

cushion frames 20 and 22 on either side]. Consequently, a lost part of the detection weight by the large load which escapes to a floor 10 through pin 14C can be rectified by the force to the front which acts on the front lever 66 and the back lever 74.
[0050] In addition, when a vehicle slows down at the time of braking, a lost part of the detection weight by the load which escapes to a floor through a pin by deceleration by the force to the front which acts on the front lever 66 and the back lever 74 can be compensated similarly.
[0051] When the crew 14 who sat down on the sheet 12 does a backward-tilting posture, while the load which escapes from crew's 14 pin 10C on a floor 10 becomes small on the other hand, the decrement of the load concerning the pars anterior of a seat cushion 16 becomes small compared with the augend of the load concerning the posterior part of a seat cushion 16. For this reason, the load doubled by the front lever 66 also becomes small, and the small load which escaped from crew's 14 pin 14C on the floor 10 can be rectified. In addition, when a vehicle accelerates and a vehicle goes up a slope, a lost part of the detection weight by the small load which escapes to a floor 10 through pin 14C according to the inclination of acceleration and a slope by the force to the back which acts on the front lever 66 and the back lever 74 can be rectified similarly.
[0052] Therefore, with the crew weight detection equipment of the **** 3 operation gestalt, the error with crew's 14 presumed weight measured by crew's actual weight and load sensor 78 can be made small, and crew's weight can be presumed with a sufficient precision. Moreover, a parts cost can be reduced because of the easy configuration which detects a load by one load sensor 78 using the front lever 66 and the back lever 74. Moreover, the load sensor 78 can be protected from a large load with the load receptacle spring 80 and the stoppers 84 and 86 for a movable domain limit.
[0053] Moreover, with the crew weight detection equipment of the **** 3 operation gestalt, since the levers 66 and 74 of four front and rear, right and left are used, while support rigidity is high and there are few problems of the backlash by the shortage of support rigidity, in addition to the load receptacle spring 80, vibration transmitted from the car body to a sheet can be easily reduced by using a shake-free material and shake-free structure for the stoppers 84 and 86 for a movable domain limit.
[0054] Although this invention was explained above in detail about the specific operation gestalt, this invention is not limited to such operation gestalt, and it is clear its for other various operation gestalt to be possible within the limits of this invention for this contractor.
[0055]
[Effect of the Invention] A load detection means to detect each load applied before and after a sheet including the load which this invention according to claim 1 requires for a seat back, A correction means to rectify each load before and after computing the load center of gravity of a sheet based on each load before and after detecting with a load detection means and detecting with a load detection means based on the calculation value, Since it has a crew weight estimation means to presume crew weight based on the correction load rectified with the correction means, a parts cost can be reduced and it has the outstanding effect that crew's weight can be presumed with a sufficient precision.
[0056] The front lever rocked according to the load applied to the pars anterior of a sheet including the load which this invention according to claim 2 requires for a seat back, The back lever rocked according to the load applied to the posterior part of a sheet including the load concerning a seat back, A load detection means to detect the sum of the load doubled by the front lever by the predetermined rate of redoubling, and the load doubled by the back lever by the predetermined rate of redoubling, the rate of load redoubling according the rate of load redoubling by ****** and the front lever to a back lever -- comparing -- the rate of predetermined -- since it set up greatly, a parts cost can be reduced and it has the outstanding effect that crew's weight can be presumed with a sufficient precision

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[Translation done.]

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] A load detection means to detect each load applied before and after a sheet including the load concerning a seat back, A correction means to rectify each load before and after computing the load center of gravity of a sheet based on each load before and after detecting with this load detection means and detecting with the aforementioned load detection means based on the calculation value, Crew weight detection equipment characterized by having a crew weight estimation means to presume crew weight based on the correction load rectified with this correction means.
[Claim 2] The front lever rocked according to the load applied to the pars anterior of a sheet including the load concerning a seat back, The back lever rocked according to the load applied to the posterior part of a sheet including the load concerning a seat back, A load detection means to detect the sum of the load doubled by the lever before the above by the predetermined rate of redoubling, and the load doubled by the lever after the above by the predetermined rate of redoubling, the rate of load redoubling according the rate of load redoubling by ****** and the lever before the above to the lever after the above -- comparing -- the rate of predetermined -- the crew weight detection equipment characterized by setting up greatly

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[Translation done.]

DESCRIPTION OF DRAWINGS

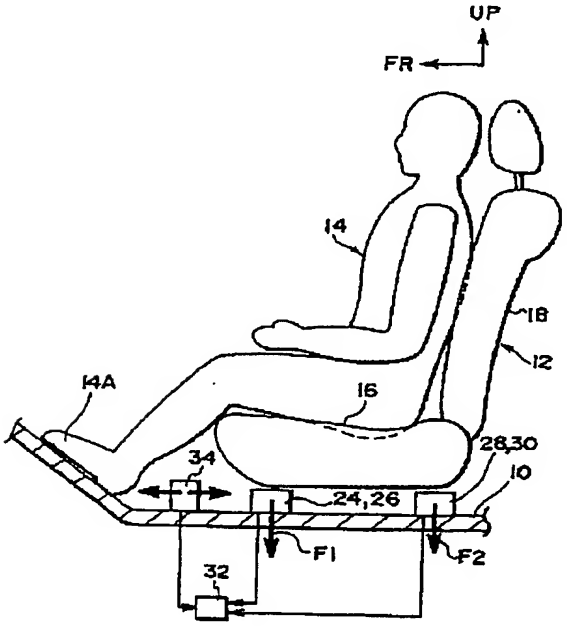
[Brief Description of the Drawings]
[Drawing 1] It is the outline side elevation showing the important section of the crew weight detection equipment concerning the 1st operation gestalt of this invention.
[Drawing 2] It is the outline perspective diagram seen from the vehicle slanting front which shows the important section of the crew weight detection equipment concerning the 1st operation gestalt of this invention.
[Drawing 3] It is the graph which shows the relation of the instrumentation sheet load of crew weight detection equipment and weight concerning the 1st operation gestalt of this invention.
[Drawing 4] It is the outline perspective diagram showing the important section of the crew weight detection equipment concerning the 2nd operation gestalt of this invention.
[Drawing 5] It is the outline side elevation showing the important section of the crew weight detection equipment concerning the 2nd operation gestalt of this invention.
[Drawing 6] (A) And (B) is operation explanatory drawing of the crew weight detection equipment concerning the 2nd operation gestalt of this invention.
[Drawing 7] It is the outline side elevation showing the important section of the crew weight detection equipment concerning the 3rd operation gestalt of this invention.
[Drawing 8] It is the outline perspective diagram seen from the vehicle slanting front which shows the important section of the crew weight detection equipment concerning the 3rd operation gestalt of this invention.
[Drawing 9] It is the expansion side elevation showing the back lever section of the crew weight detection equipment concerning the 3rd operation gestalt of this invention.
[Drawing 10] It is the outline side elevation showing the important section of the crew weight detection equipment concerning the conventional operation gestalt.
[Description of Notations]
12 Sheet
16 Seat Cushion
18 Seat Back
20 Seat Cushion Frame
22 Seat Cushion Frame
24 Front Side Load Sensor (Load Detection Means)
26 Front Side Load Sensor (Load Detection Means)
28 Back Side Load Sensor (Load Detection Means)
30 Back Side Load Sensor (Load Detection Means)
32 Load Estimation Circuit (Correction Means, Crew Weight Estimation Means)
34 Acceleration Sensor
40 Sheet Slide Rail
42 Sheet Slide Lower Rail
44 Sheet Slide Upper Rail
47 Front Lever
52 Load Sensor (Load Detection Means)
55 Back Lever
66 Front Lever

74 Back Lever
78 Load Sensor (Load Detection Means)
82 Connecting Rod

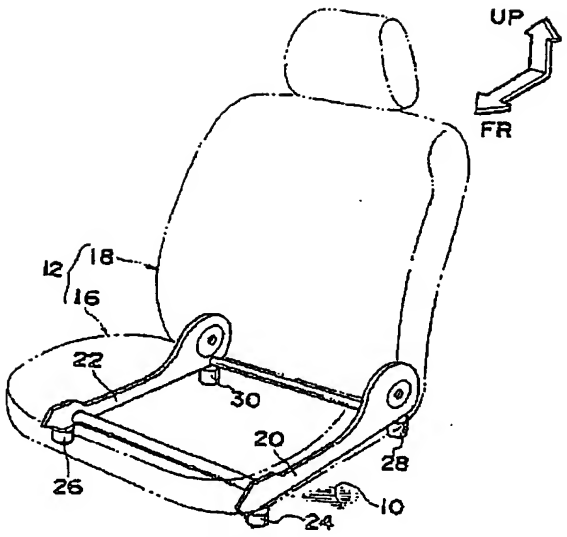
[Translation done.]

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

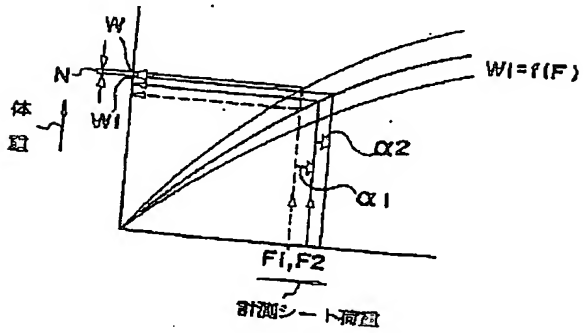
DRAWINGS

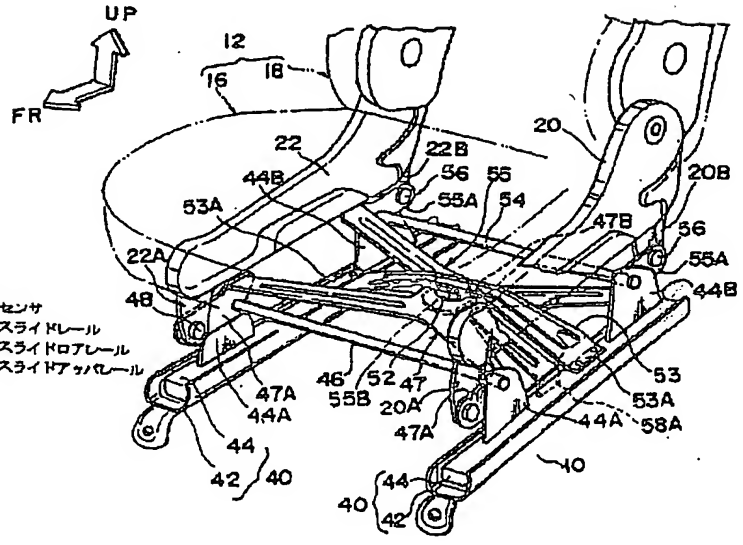


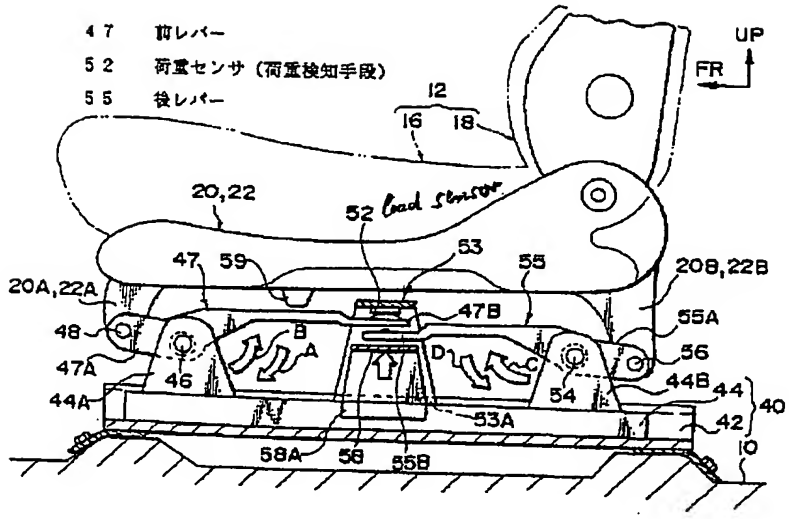
12	シート
16	シートクッション
18	シートバック
32	荷重推定回路（補正手段、乗員体重推定手段）
34	加速度センサ

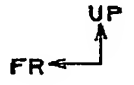


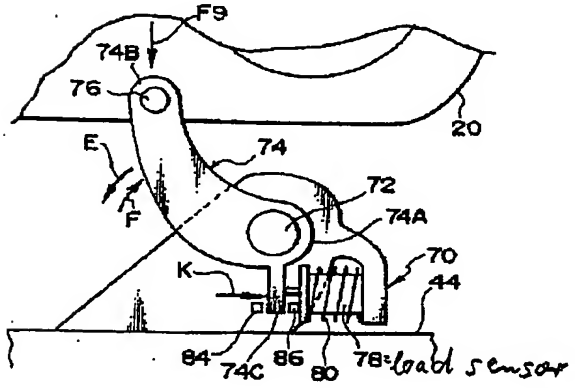
20 シートクッションフレーム
22 シートクッションフレーム
24 前方側荷重センサ（荷重検知手段）
26 前方側荷重センサ（荷重検知手段）
28 後方側荷重センサ（荷重検知手段）
30 後方側荷重センサ（荷重検知手段）

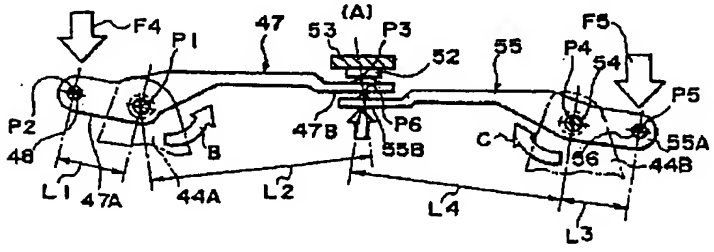


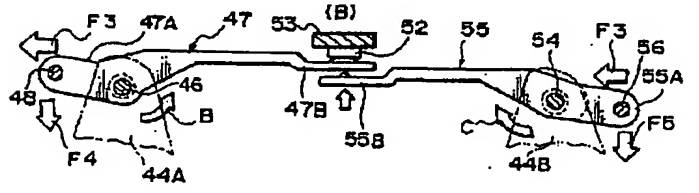


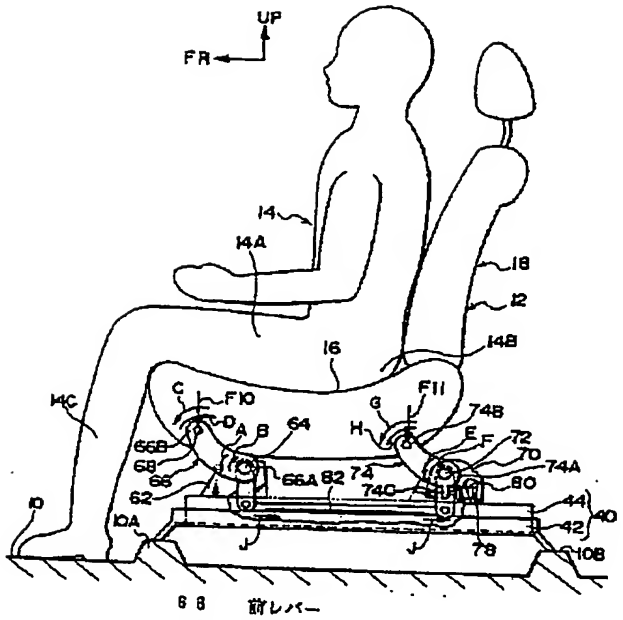

47 前レバー
52 荷重センサ（荷重検知手段）
55 後レバー
UP
FR
12
16
18
20,22
52 load sensor
53
55
47
59
20A,22A
208,22B
47B
55A
48
B
A
D
C
56
47A
46
54
44B
44
40
44A
53A
42
10
58A
58
55B


UP
FR

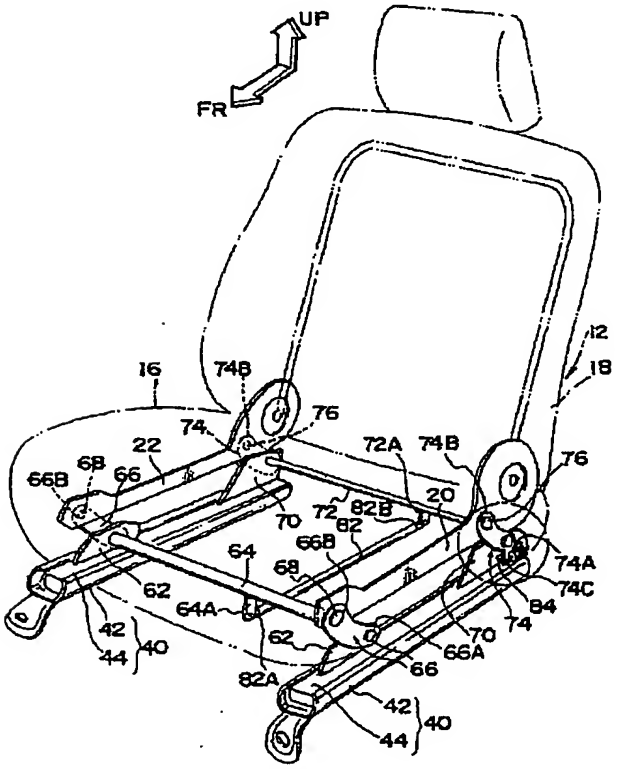

F9
74B
76
20
E
74
72
F
74A
K
70
44
84
74C
86
80
78: load sensor

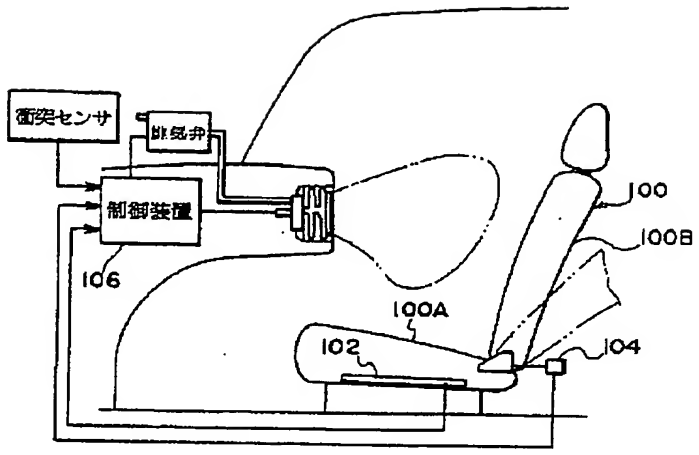

F4
P1
47
53
(A)
P3
52
55
F5
P4
54
P5
P2
48
47B
P6
55B
B
C
55A
56
44B
L1
47A
44A
L2
L4
L3


F3
47A
47
53
(B)
52
55
54
F3
56
55A
48
46
B
47B
55B
C
F5
F4
44A
44B



68 前レバー
74 後レバー
78 荷重センサ（荷重検知手段）
82 コネクティングロッド





[Translation done.]

cushion 16 through the back lever 55 to the seat cushion 16. Consequently, since the rate of redoubling of the load which acts on the front lever 47 is set up more highly than the rate of redoubling of the load which acts on the back lever 55, a lost part of the detection weight by the load which escapes to a floor through crew's pin can be rectified by the increment of a load which acts on the front lever 47.

[0033] Moreover, although the load F6 which escapes to a floor 10 through crew's pin becomes large when a vehicle goes down a slope In this case, while the force to the front by the inclination of a slope acts on the load which acts on the pars anterior of a seat cushion 16 from the regio femoralis of the crew who sat down to the seat cushion 16 through the front lever 47 In order that the force to the front by the inclination of a slope may act also on the load which acts on the posterior part of a seat cushion 16 from the hip of the crew who sat down to the seat cushion 16 through the back lever 55, Also in this case, a lost part of the detection weight by the load which escapes to a floor through crew's pin can be rectified like the time of braking by the force to the front which acts on the front lever 47 and the back lever 55.

[0034] When the crew who sat down on the sheet 12 does a backward-tilting posture, while the load which escapes from crew's pin on a floor becomes small on the other hand, the augend of the load concerning the posterior part of a seat cushion 16 becomes large compared with the decrement of the load concerning the pars anterior of a seat cushion 16. For this reason, the load doubled by the front lever 47 also becomes small, and the small load which escaped from crew's pin on the floor can be rectified. In addition, when a vehicle accelerates and a vehicle goes up a slope, a lost part of the detection weight by the small load which escapes to a floor through a pin with acceleration by the force to the back which acts on the front lever 47 and the back lever 55 can be rectified similarly.

[0035] Therefore, with the crew weight detection equipment of the **** 2 operation gestalt, the error with crew's presumed weight measured by crew's actual weight and load sensor 52 can be made small, and crew's weight can be presumed with a sufficient precision. Moreover, a parts cost can be reduced because of the easy configuration which detects a load by one load sensor 52 using the front lever 47 and the back lever 55. Moreover, the load sensor 52 can be protected from a large load with the stopper 58 for a movable domain limit, and the stopper 59.

[0036] In addition, with the **** 2 operation gestalt, a stopper 58 is arranged underneath the front end section 55B of the back lever 55, and although the stopper 59 has been arranged in the lower part of the seat cushion 16 which counters near the back end section 47B of the front lever 47, the position of a stopper 58 and the stopper 59 is not limited to these positions.

[0037] Next, the 3rd operation gestalt of the crew weight detection equipment of this invention is explained according to drawing 7 - view 9..

[0038] the [in addition,] -- the [1 operation gestalt and] -- if attached to the same member as 2 operation gestalt, the same sign is attached and the explanation is omitted

[0039] As shown in drawing 8 , near the front end section of the sheet slide upper rail 44 on either side, the shaft 64 is supported to revolve possible [rotation] through the front bracket 62. Soffit section 66A of the front lever 66 is being fixed to the both ends of this shaft 64, respectively, and rotation of the front lever 66 and the shaft 64 to the anti-clock hand of cut (the orientation of arrow head A of drawing 7) of drawing 7 and the clock hand of cut (the orientation of arrow head B of drawing 7) of drawing 7 is enabled.

[0040] It is supported to revolve near the front end section of the seat cushion frames 20 and 22 of right and left of a sheet 12 with the shaft 68 by upper-limit section 66B of the front lever 66 possible [the rotation to the anti-clock hand of cut (the orientation of arrow head C of drawing 7) of drawing 7 , and the clock hand of cut (the orientation of arrow head D of drawing 7) of drawing 7].

[0041] Moreover, near the back end section of the sheet slide upper rail 44 on either side, the shaft 72 is supported to revolve possible [rotation] through the back bracket 70. Soffit section 74A of the back lever 74 is being fixed to the both ends of this shaft 72, respectively, and rotation of the back lever 74 and the shaft 72 to the anti-clock hand of cut (the orientation of arrow head E of drawing 7) of drawing 7 and the clock hand of cut (the orientation of arrow head F of drawing 7) of drawing 7 is enabled.

[0042] It is supported to revolve near the back end section of the seat cushion frames 20 and 22 of right and left of a sheet 12 with the shaft 76 by upper-limit section 74B of the back lever 74 possible

[the rotation to the anti-clock hand of cut (the orientation of arrow head G of drawing 7) of drawing 7 , and the clock hand of cut (the orientation of arrow head H of drawing 7) of drawing 7].
[0043] As shown in drawing 9 , to soffit section 74A of the left-hand side back lever 74 If heights 74C is formed below and the load F9 to a lower part acts on the upper-limit section 74 of the back lever 74 from the seat cushion frame 20 The back lever 74 rotates a shaft 72 to a center of rotation to the anti-clock hand of cut (the orientation of arrow head E of drawing 9) of drawing 9 , and presses the load sensor 78 as a load detection means by which heights 74C was attached in the back bracket 70, back (the orientation of arrow head K of drawing 9). In addition, the load receptacle spring 80 is arranged in the periphery section of the load sensor 78, and the back lever 74 is energized to the clock hand of cut (the orientation of arrow head F of drawing 9) of drawing 9 .
[0044] As shown in drawing 8 , the shaft 64 and the shaft 72 are connected through the connecting rod 82. These connecting-rod 82 order both ends 82A and 82B are supported to revolve possible [rotation] by heights 64A and heights 72A which were formed in the shaft 64 and the shaft 72, respectively, on the turning effort which acts on a shaft 64, a connecting rod 82 moves back (the orientation of arrow head J of drawing 7), and the turning effort which acts on a shaft 64 is applied to the turning effort of a shaft 72.
[0045] moreover, the length of the back lever 74 -- comparing -- the length of the front lever 66 -- a predetermined length -- the rate of redoubling of the load to which the rate of redoubling of the load which is set up for a long time and acts on the front lever 66 acts on the back lever 74 -- the rate of predetermined -- it is set up highly Consequently, the load which acts on the front lever 66, and the load which acts on the back lever 74 are doubled from the predetermined rate of redoubling, respectively, and it acts on the load sensor 78.
[0046] In addition, as shown in drawing 9 , the stoppers 84 and 86 for a movable domain limit are arranged in the position before and after heights 74C by the back bracket 70, and the load sensor 78 is protected with the load receptacle spring 80 to it.
[0047] Next, an operation of the **** 3 operation gestalt is explained. With the crew weight detection equipment of the **** 3 operation gestalt, if crew 14 sits down to a seat cushion 16 as shown in drawing 7 , the load which acts on the pars anterior of a seat cushion 16 will act on the front lever 66 from regio-femoralis 14A of the crew 14 who sat down to the seat cushion 16 [near the front end section of the seat cushion frames 20 and 22 on either side]. Moreover, the load which acts on the posterior part of a seat cushion 16 acts on the back lever 74 from hip 14B of the crew 14 who sat down to the seat cushion 16 [near the back end section of the seat cushion frames 20 and 22 on either side]. Consequently, while a load acts on soffit section 66A of the front lever 66, and soffit section 74A of the back lever 74, crew's 14 weight can be presumed by the load which acts on soffit section 66A of the front lever 66 through a connecting rod 82 being transmitted to the back lever 74, and measuring these loads by the load sensor 78.
[0048] Moreover, although the load which escapes to a floor through crew's 14 pin becomes large for example, when crew 14 is in an anteversion posture in this case, from regio-femoralis 14A of the crew 14 who sat down to the seat cushion 16 [near the front end section of the seat cushion frames 20 and 22 on either side] The augend of a load F10 which acts on the pars anterior of a seat cushion 16 from hip 14B of the crew 14 who sat down to the seat cushion 16 [near the back end section of the seat cushion frames 20 and 22 on either side] It becomes large to the decrement of a load F11 which acts on the posterior part of a seat cushion 16. Consequently, since the rate of redoubling of the load which acts on the front lever 66 is set up more highly than the rate of redoubling of the load which acts on the back lever 74, a lost part of the detection weight by the large load which escapes to a floor 10 through pin 14C can be rectified by the increment of a load which acts on the front lever 66.
[0049] Moreover, as well as the 2nd operation gestalt when a vehicle goes down a slope, although the load which escapes to a **** floor becomes large, crew's 14 pin in this case, from regio-femoralis 14A of the crew 14 who sat down to the seat cushion 16 [near the front end section of the seat cushion frames 20 and 22 on either side] While the force to the front by the inclination of a slope acts on the load which acts on the pars anterior of a seat cushion 16 The force to the front by the inclination of a slope acts on the load which acts on the posterior part of a seat cushion 16 from hip 14B of the crew 14 who sat down to the seat cushion 16 [near the back end section of the seat

cushion frames 20 and 22 on either side]. Consequently, a lost part of the detection weight by the large load which escapes to a floor 10 through pin 14C can be rectified by the force to the front which acts on the front lever 66 and the back lever 74.
[0050] In addition, when a vehicle slows down at the time of braking, a lost part of the detection weight by the load which escapes to a floor through a pin by deceleration by the force to the front which acts on the front lever 66 and the back lever 74 can be compensated similarly.
[0051] When the crew 14 who sat down on the sheet 12 does a backward-tilting posture, while the load which escapes from crew's 14 pin 10C on a floor 10 becomes small on the other hand, the decrement of the load concerning the pars anterior of a seat cushion 16 becomes small compared with the augend of the load concerning the posterior part of a seat cushion 16. For this reason, the load doubled by the front lever 66 also becomes small, and the small load which escaped from crew's 14 pin 14C on the floor 10 can be rectified. In addition, when a vehicle accelerates and a vehicle goes up a slope, a lost part of the detection weight by the small load which escapes to a floor 10 through pin 14C according to the inclination of acceleration and a slope by the force to the back which acts on the front lever 66 and the back lever 74 can be rectified similarly.
[0052] Therefore, with the crew weight detection equipment of the **** 3 operation gestalt, the error with crew's 14 presumed weight measured by crew's actual weight and load sensor 78 can be made small, and crew's weight can be presumed with a sufficient precision. Moreover, a parts cost can be reduced because of the easy configuration which detects a load by one load sensor 78 using the front lever 66 and the back lever 74. Moreover, the load sensor 78 can be protected from a large load with the load receptacle spring 80 and the stoppers 84 and 86 for a movable domain limit.
[0053] Moreover, with the crew weight detection equipment of the **** 3 operation gestalt, since the levers 66 and 74 of four front and rear, right and left are used, while support rigidity is high and there are few problems of the backlash by the shortage of support rigidity, in addition to the load receptacle spring 80, vibration transmitted from the car body to a sheet can be easily reduced by using a shake-free material and shake-free structure for the stoppers 84 and 86 for a movable domain limit.
[0054] Although this invention was explained above in detail about the specific operation gestalt, this invention is not limited to such operation gestalt, and it is clear its for other various operation gestalt to be possible within the limits of this invention for this contractor.
[0055]
[Effect of the Invention] A load detection means to detect each load applied before and after a sheet including the load which this invention according to claim 1 requires for a seat back, A correction means to rectify each load before and after computing the load center of gravity of a sheet based on each load before and after detecting with a load detection means and detecting with a load detection means based on the calculation value, Since it has a crew weight estimation means to presume crew weight based on the correction load rectified with the correction means, a parts cost can be reduced and it has the outstanding effect that crew's weight can be presumed with a sufficient precision.
[0056] The front lever rocked according to the load applied to the pars anterior of a sheet including the load which this invention according to claim 2 requires for a seat back, The back lever rocked according to the load applied to the posterior part of a sheet including the load concerning a seat back, A load detection means to detect the sum of the load doubled by the front lever by the predetermined rate of redoubling, and the load doubled by the back lever by the predetermined rate of redoubling, the rate of load redoubling according the rate of load redoubling by ****** and the front lever to a back lever -- comparing -- the rate of predetermined -- since it set up greatly, a parts cost can be reduced and it has the outstanding effect that crew's weight can be presumed with a sufficient precision

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[Translation done.]